CLAIMS

1. A security document comprising a sheet-like substrate having one or more layers containing solid inorganic particles of controlled shape for forming an authentication device in a first location on a security document, the particles having at least a first dimension in the range of 1 to 200 nanometers.

2. A security document according to claim 1, wherein the particles are substantially spherical.

3. A security document according to claim 1, wherein the particles are elongated.

4. A security document according to claim 3, wherein at least a first group of the particles are aligned so that their longitudinal axes are substantially parallel.

5. A security document according to claim 4, wherein the longitudinal axis of the first group of particles extend in a first direction at an angle to the plane of the security document.

6. A security document according to claim 5, wherein a second group of particles are aligned so that their longitudinal axes extend in a second direction at an angle to the plane of the security document, the first and second directions being noncolinear.

7. A security document according to any one of claims 4 to 6, wherein the first group of particles are arranged so as to polarise incident light waves.

8. A security document according to claim 7, and further comprising, at a second location, a polarising analyser for interaction with the light polariser at the first location.

9. A security document according to claim 1, wherein the particles are spherical and form a series of particles concatenated together.

10. A security document according to any one of the preceding claims, wherein the particles are laterally spaced from each other so as to form at least a first defraction grating at the first location.

11. A security document according to claim 10, wherein the lateral spacing is achieved by coating each particle with a transparent material of controlable thickness, such as silica.

12. A security document according to any one of the preceding claims, wherein the particles are selected from materials which reflect incident light waves.

13. A security document according to any one of claims 1 to 11, wherein the particles act to fluoresce or luminous light waves therefrom.

14. A security document according to any one of claims 1 to 11, wherein the particles are selected from materials to reflect incident sound or acoustic waves.

15. A security document according to any one of claims 1 to 11, wherein the particles are selected from materials that absorb light or sound energy and subsequently re-emit said energy acoustically.

16. A security document according to any one of the preceding claims, wherein the particles are made from material which is orientable in an electric, magnetic or electromagnetic field.

17. A method of producing a security document, comprising the steps of:

(a) forming a sheet-like substrate having one or more layers containing particles for forming an authentication device at a first location on the security document, the particles having at least a first dimension in the range of 1 to 200 nanometers,

(b) melting at least a portion of the first layer such that the particles can orient under the influence of an external field,

(c) applying the external field so as to orient particles,

(d) allowing the first layer to cool so as to fix the orientation of the particles.

18. A method of producing a security document, according to claim 17, wherein the external field is one of an electric, magnetic, electromagnetic or mechanically induced stress field.

19. A method for producing a security feature for use in security document, comprising the steps of:

(a) forming a sheet-like substrate,

(b) producing pores in an outer layer of the substrate at regular intervals, the pores having a predetermined alignment with each other, and

(c) depositing particles in the pores, the particles having at least a first mention in the range of 1 to 200 nanometers.

20. A method for producing a security feature according to claim 19, wherein the particles are deposited by an electrodeposition process.

21. A method for producing a security feature according to either of claims 19 or 20, wherein the outer layer is made from either a metal or polymer based material.

22. A method for producing a security feature according to any of claims 19 to 21, wherein the pores are formed by orienting the substrate so that it's plane is at an angle to the beam of an energy source, exposing the substrate to the energy source beam such that pores are formed in an outer layer of the substrate, a longitudinal axis of the pores being substantially aligned with the direction of the energy source beam.

23. A method of producing a security document, comprising the steps of:

(a) forming a sheet-like substrate,

(b) placing particles for forming an authentication device on a transfer film, the particles having at least a first dimension in the range of 1 to 200 nanometers, and

(c) using the die to cause the transfer film to press the particles into the substrate.

24. A method of producing a security document according to claim 23, wherein the die is heated so that an outer layer of the substrate is melted to thereby facilitate the transfer of the particles from the transfer film into the substrate.

25. A method of producing a security document according to either of claims 23 or 24, wherein the die is an embossing die adapted to form a saw tooth or like profile in the surface of the substrate for positioning of the particles in the outer layer of the substrate, whereby the longitudinal access of the particles is at an angle to the plane of the security document.